Documentation for Model Output corresponding with the publication "**Inter-comparison of Atmospheric Trace Gas Dispersion Models: Barnett Shale Case Study", Karion et al.**
https://doi.org/10.5194/acp-2018-736

Please refer to the publication, particularly the information in the Supplementary Information, for details on the model configuration.

Footprint files:

Footprints generated every 30 seconds along flight paths using different models are archived as netCDF files. Each tar.gz file contains all the netCDF footprints for a particular flight and model combination, and is named after the model combination and flight date (YYYYMMDD). For example the WRF-HYSPLIT combination for the flight on 10/19/2013 referenced in the paper is in:

WRF-HYSPLIT/WRFHYS_Footprints_20131019.tar.gz

Most flight footprints were run for 24 hours back in time but there are a few exceptions, so the files must be opened to see how far back the footprints go. A few flights use shorter times, and on 10/28/2013 WRF-HYSPLIT was run for 36 hours. The HYSPLIT footprint files are numbered consecutively in order of time. The location and time of the receptor is in the NetCDF file itself, not in the filename. The STILT filenames have location and time information but only to the nearest minute, so the numerical order in the filename indicates their time order, because there are two footprints each minute. STILT and HYSPLIT footprints all also contain particle trajectories. The receptor location and time is in the NetCDF file as origutctime, origlat, origlong, etc.

Datasets | Catalogs | Bookmarks

Name	Long Name	Type
▼ 20131019.147.footprint.nc	20131019.147.footprint.nc	Local File
checkbasic	basic output from Trajeccheck()	1D
checkbasicnames	names for checkbasic 1D array	—
checksum	checksum array	2D
checksumdate	checksumdate	1D
checksumnames	column names for checksum array	—
foot	gridded stilt footprint	Geo2D
footdate	footdate	1D
foothr	stilt footprint hours back from stilt start time	1D
footlat	footlat	1D
footlon	footlon	1D
ident	identifier string	—
nchar	nchar	1D
origagl	original receptor height above ground	—
origlat	original receptor latitude	—
origlon	original receptor longitude	—
origutctime	original receptor time	—
origutctimeformat	original receptor time (origutctime) format	—
part	stilt particle location array	2D
partdate	partdate	1D
partnames	column names for particle array	—

Figure 1. Description and variables in a WRF-HYSPLIT NetCDF footprint (20131019.147.footprint.nc) (from Panoply).

The files include footprints from basic model runs referenced in Figures 4 and 7, that is NAMS-HYSPLIT, WRF-HYSPLIT, and WRF-STILT. WRF-STILT for flights on 3/25, 3/27, 3/30 and 10/16 uses instantaneous wind output; WRF-STILT for 10/19, 10/20, 10/25, and 10/28 flights uses averaged wind fields (see the SI in the manuscript for details). For WRF2-Flexpart footprints, please contact Wayne.Angevine@noaa.gov. For CarbonTracker Lagrange WRF-STILT footprints, contact Arlyn.Andrews@noaa.gov. For WRF-LPDM footprints, please contact Thomas Lauvaux (thomas.lauvaux@lsce.ipsl.fr).

WRF-Chem output files:

WRF-Chem output for 4 flights in October 2013 is included in this repository, both in native NetCDF format and in ARL format. These contain 3-km resolution, hourly WRF-Chem output. Daily ARL files can be used to run HYSPLIT or STILT. The hourly NetCDF formatted files include the tracer variables for CH4 from both the EPA inventory (tracer_1 variable) and the EDF inventory used in the paper (tracer_2 variable). The third tracer (tracer_3) is using the EPA inventory but masked so that emissions outside the domain of the EDF inventory are zero (so that they can be directly compared). Only tracer_2 is used in the manuscript. The NetCDF output files are combined into tar.gz files. Please contact Thomas Lauvaux (thomas.lauvaux@lsce.ipsl.fr) for details regarding WRF-Chem, including assistance reading the NetCDF files, especially for users who are not familiar with WRF NetCDF output.

Observations:

Observations from the Barnett flight campaign are made available by NOAA/ESRL, please contact Colm.Sweeney@noaa.gov.